

Initial Conditions | Aerosol Properties | **Advanced Settings**

Simulation type

 Chamber Parcel

fit parameters

Fit parameters for temperate and pressure profile of the form

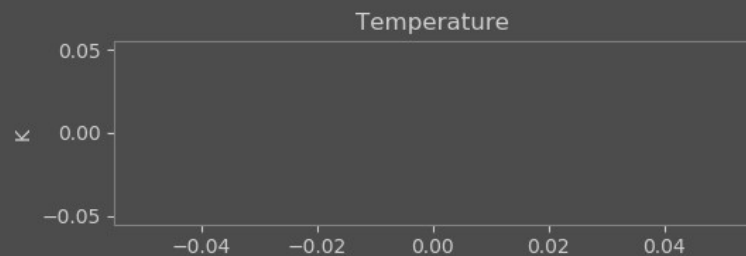
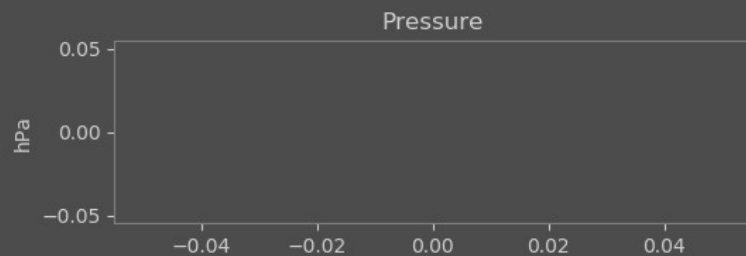
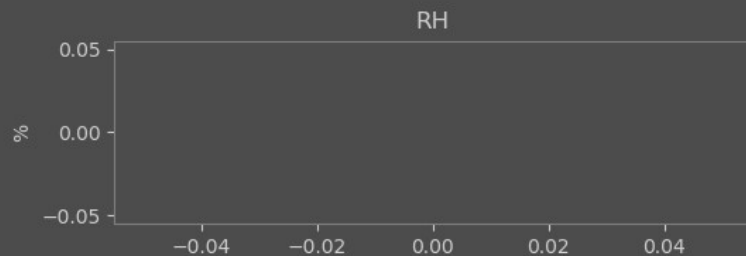
 $y = A \cdot \exp(-B \cdot x) + T_{int}$ Temperature A B Pressure A B

RH

Pressure (hPa)

Temperature (K)

Runtime (seconds)



Plotting model data

 RH Temperature Pressure Number of ice crys Number of drops LWC

Select data file

Expansion start date

and time

Expansion Duration (seconds)

Plotting observations

 Temperature Pressure Ice number Total number plot with model output

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Fit parameters for temperate and pressure profile of the form $y = A \cdot \exp(-B \cdot x) + T_{int}$

Temperature A B

Pressure A B

RH

Pressure (hPa)

Temperature (K)

Runtime (seconds)

Select what kind of simulation to run:

Chamber – simulate the conditions within a cloud chamber, assuming adiabatic expansion, water/ice covered walls, rate of change of temperature (and pressure) follows exponential function $y = A \cdot \exp(-B \cdot x) + C$. Values for A and B are given by the user in the 'fit parameters' box

Parcel - simulate conditions in a rising parcel of air assuming adiabatic expansion, rate of change of pressure and temperature are driven by updraft velocity specified by the user, when parcel is selected a input box for updraft velocity appears. The updraft velocity is applied constantly throughout the simulation, therefore the 'Runtime' determines the height to which the parcel rises.

Initial conditions inside the chamber or parcel of air

How long to run the simulation for

Initial Conditions | **Aerosol Properties** | Advanced Settings

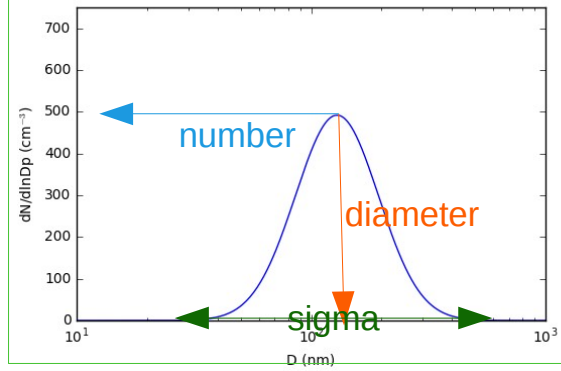
number of modes

	Mode_1
Number	<input type="text" value="100e6"/>
Diameter	<input type="text" value="100e-9"/>
Sigma	<input type="text" value="0.5"/>
Mass Fraction	
ammonium sulphate	<input type="text" value="1.0"/>
sea salt	<input type="text" value="0.0"/>
sulphuric acid	<input type="text" value="0.0"/>
fulvic acid	<input type="text" value="0.0"/>
Kaolinite	<input type="text" value="0.0"/>
Montmorinillite	<input type="text" value="0.0"/>
Feldspar	<input type="text" value="0.0"/>
Illite	<input type="text" value="0.0"/>
Bio	<input type="text" value="0.0"/>

Click here to enter initial aerosol conditions

Enter the number of lognormal aerosol modes

Enter the number, median diameter and the natural logerithm of the geometric standard deviation (sigma) for each aerosol mode eg.



Number = 500 cm⁻³
 Diameter = 130 nm
 Sigma = 0.4

Enter the fractional composition of the aerosol for each mode, if the required aerosol type is not listed, click 'Add another aerosol type'

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Size of smallest aerosol size bin (m)

model time step (seconds)

Heterogeneous freezing criteria

Select Output file

Run

These should not require changing, however if modelling very small aerosol sizes on the order of 10nm, then the smallest aerosol size bin should be reduced

For considering immersion/condensation freezing, define when conditions are met for ice to nucleate eg **RH>1** means ice can only form above water saturation, **Activated drops** means only aerosol particles that are cloud drops can nucleate ice, **threshold water mass** means only aerosol particles that have a user defined threshold water mass condensed onto them can nucleate ice. Once the criteria has been met the number of nucleated ice crystals is calculated following the ns parameterisation which is dependant on aerosol surface area and temperature

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 $y = A * \exp(-B * x) + T_{int}$

Temperature A B

Pressure A B

RH

Pressure (hPa)

Temperature (K)

Runtime (seconds)

Select where to save the model output file, this is a netcdf file

Once all the initial conditions have been entered, click here to run the simulation

Once the model has run, the output can be plotted using the panel to the right hand side

Select model variables to plot

Observation files can be uploaded and data plotted within the GUI. Use the default values for start date and time with the demo files (demo_pressure.txt, demo_temperature.txt, demo_CDP.min) as an example. These are observations from a cloud chamber experiment in the manchester ice cloud chamber

